University of Puerto Rico
Mayagüez Campus
College of Engineering
Department of Electrical and Computer Engineering
Master of Science in Electrical Engineering

Course Syllabus

1. General Information:

Alpha-numeric codification: INEL6XXX
Course Title: Biomedical Acoustics
Number of credits: 3
Contact Period: 3 hours of lecture per week

2. Course Description:

English: Application of acoustics principles toward the design of diagnostic and therapeutic medical devices. Use of computer tools to simulate the acoustic response of systems composed of biological tissues.

Spanish: Aplicación de principios de acústica para el diseño de dispositivos médicos diagnósticos y terapéuticos. Uso de herramientas de computadoras para simular la respuesta acústica de sistemas compuestos de tejidos biológicos.

3. Pre/Co-requisites and other requirements:

Permission of the department head.

4. Course Objectives:

- Apply acoustics principles toward the design of diagnostic and therapeutic medical devices.
- Employ computer tools to simulate the acoustic response of systems composed of biological tissues.
- Examine and analyze current scientific literature in the field of biomedical acoustics.

5. Instructional Strategies:

☒conference ☐discussion ☐computation ☐laboratory

☐seminar with formal presentation ☐seminar without formal presentation ☐workshop

☐art workshop ☐practice ☐trip ☐thesis ☐special problems ☐tutoring

☐research ☐other, please specify:

6. Minimum or Required Resources Available:

Personal computers with MATLAB software.

7. Course time frame and thematic outline

Outline	Contact Hours
Introduction to biomedical acoustics	1
Vibrating systems	8
Acoustic wave equation	3
Planar and spherical waves in fluid media	6
Sound reflection and transmission at interfaces	4
Sound propagation in lossy media	2

Radiation and perception of sound waves	2
Sound propagation in tubes, cavities and waveguides	3
Ultrasound imaging	6
Recent advances in biomedical acoustics	8
Exams	2
Total hours: (equivalent to contact period)	45

8. Grading System

☒ Quantifiable (letters) ☐ Not Quantifiable

9. Evaluation Strategies

	Quantity	Percent
☒ **Exams**	**2**	**50%**
☐ **Final Exam**		
☐ **Short Quizzes**		
☒ **Oral Reports**	**1**	**25%**
☐ **Monographies**		
☐ **Portfolio**		
☒ **Projects**	**1**	**25%**
☐ **Journals**		
☐ **Other, specify:**		
TOTAL:		**100%**

10. Bibliography:

Szabo, T., (2004) Diagnostic Ultrasound Imaging: Inside and Out, Academic Press.
Kinsler, L.E., Frey, A.R., Coppens, A.B., Sanders, J.V., (1999) Fundamentals of Acoustics 4th Edition, Wiley. (Key textbook in the field of acoustics)
Blackstock, D.T., (2000) Fundamentals of Physical Acoustics, Wiley-Interscience. (Key textbook in the field of acoustics)
Journal of the Acoustical Society of America. (www.uprm.edu/library)
IEEE Transactions on Biomedical Engineering. (www.uprm.edu/library)
Acoustical Society of America - http://asa.aip.org/
Biomedical Engineering Society - http://www.bmes.org/

11. According to Law 51

Students will identify themselves with the Institution and the instructor of the course for purposes of assessment (exams) accommodations. For more information please call the Student with Disabilities Office which is part of the Dean of Students office (Chemistry Building, room 019) at (787)265-3862 or (787)832-4040 extensions 3250 or 3258.